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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,289	07/11/2003	David J. Hemker	LAM1P128/P0561	4379
22434	7590	07/28/2005	EXAMINER	
BEYER WEAVER & THOMAS LLP			ANDERSON, MATTHEW A	
P.O. BOX 70250			ART UNIT	
OAKLAND, CA 94612-0250			PAPER NUMBER	

1722

DATE MAILED: 07/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/618,289

Applicant(s)

HEMKER ET AL.

Examiner

Matthew A. Anderson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-30 is/are pending in the application.
- 4a) Of the above claim(s) 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1,2,4-26 and 28-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/22/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Newly submitted claim 27 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The original application was entirely directed to a plasma processing system.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 27 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2, 4-26, 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lymberopoulos in view of Hills et al. (US 6,217,786 B1). and Lu (EP 0821397 A2).

Lymberopoulos et al. discloses a method of and apparatus for producing a plasma for use in manufacturing microelectronics including dry (i.e. gas phase) etching

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of semiconductor wafers. The chamber shown in Fig 5 is azimuthally symmetric around the center. The chamber holds the plasma as it is ignited and during the processing of the wafer since there is no separate plasma generation chamber. A window is disclosed in column 6 lines 8-35. The Rf antenna (i.e. a coil is shown in Fig. 5 as 110) is disposed above the plane defined by the wafer (i.e. substrate). Electromagnets (150a and 150B in Fig. 5) are disposed above the wafer. The magnets are disclosed as independently controllable conductors in the abstract and are used to control the plasma density and prevent non-uniform charge build-ups. By magnetically controlling the uniformity of charge distribution, one of ordinary skill in the art would expect the uniformity of the etching to be controlled. This reads on the changing of the variation in the magnetic field to improve processing uniformity across the substrate. The wafer is placed in the chuck at the bottom of the reaction chamber and gas is flowed in to form a plasma. In col. 10 lines 1-8, the control of the plasma density throughout the chamber from the workpiece to the inductive window and antenna is suggested. The relationship of the magnetic fields to the plane of the substrate to be etched is shown in the Figs. including that numbered 11. Clearly the magnetic field need not be perpendicular to the substrate surface. In col. 7 lines 24-31 is described the control of the magnetic field to directly control the plasma density near the workpiece surface.

Lymberopoulos does not explicitly disclose dc power to the electromagnets but dc is a known power supply configuration. Lymberopoulos is silent as to the gas used in the etching process. Lymberopoulos et al. does not specify the material used to manufacture the processing chamber.

In respect to claim 1, it would have been obvious to one of ordinary skill in the art at the time of the present invention to select dc power as a source of power in the method of Lymberopoulos et al. because DC was known in the art and was a conventional means of supplying power to electrical devices.

Lu et al. discloses a composite SiC that is used to form the chamber wall, chamber roof, collar around the wafer, grounding plane, and window for Rf radiation in a chamber to be used for plasma processing (abstract). The SiC is described as useful for reducing flaking (page 6 lines 35+). The surface after etching was smooth. This suggests little interaction of the material and the plasma. And, as table 2 shows, the etch rate of the SiC was less than the commonly used quartz or Si. The SiC was described as made from a layer of CVD SiC composite bonded to a free standing SiC wall formed from such methods as sintering or hot pressing. The bulk wall was described as grounding in lines 40-45 on page 8.

In respect to claims 1-2,4-26, 28-30, it would have been obvious to one of ordinary skill in the art at the time of the present invention to select a material (such as a composite SiC) that does not substantially react with the reactive gases flown into the processing chamber as the material from which to form the processing chamber of Lymberopoulos et al. because such a SiC chamber is suggested by Lu et al. and because that material was not substantially reactive with Rf plasmas according to Lu et al. This beneficially reduces required maintenance in the apparatus.

In respect to claims 1-2, 4-20, 28-30, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form a processing chamber

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from a material such as a composite SiC/cvd-SiC (see above) which does not substantially react with the reactive plasma gases flown into the processing chamber, forms an electrical ground, has an Rf antenna, has a coupling window, has an electro-magnet configuration above the substrate, and has variable power for the electro-magnets because such a SiC chamber is suggested by Lu et al. in light of the Lymberopoulos et al. combinations detailed above. The examiner notes that Lu et al. reads on a chamber made entirely of SiC since Lu et al discloses walls roof and Rf coupling window made of SiC.

In respect to claims 21-26, it would have been obvious to one of ordinary skill in the art at the time of the present invention to form a more electrically resistive substrate support (i.e. pedestal) than that found elsewhere in the chamber because Lu suggests such an insulating substrate support (see Page 8 lines 20-30 and Table 3).

Response to Arguments

4. Applicant's arguments filed 4/22/2005 have been fully considered but they are not persuasive.

In response to applicant's argument that Lymberopoulos et al. does not disclose using the magnets to form a radial variation, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a

manipulative difference as compared to the prior art. See *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963). Lymberopoulos discloses that the radial variation in the magnetic field is affected by power feed to the magnets.

The argument that the combined references do not teach the claimed invention is not convincing. The examiner notes that Lu suggests SiC is plasma reactors and gives a motivation of SiC requiring less maintenance than other materials such as quartz.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (571) 272-1459. The examiner can normally be reached on M-F, 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAA
July 24, 2005


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
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